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ABSTRACT

This study addressed the factors of Graduate Record Examination scores (GRE), race, gender, and undergraduate grade point average (GPA) as predictors of success on the Texas state administrator certification examination. The paper was presented as the entry point for expected discussion of the effects of high stakes accountability policies on the development of appropriate curriculum and instruction and the nurturance of an equitable and multicultural society. From 1996 through 2001, more than 337 students completed administrative certification requirements at a large urban Texas university. Data were obtained from student records and scores on the state examination (ExCet) were supplied by the Texas State Board for Educator Certification. A model/probability equation was developed to predict whether a student would pass the examination. Findings provide sufficient evidence to support the usefulness of the model. Out of 219 students for whom there was complete data who actually passed, the model predicted that 216 would pass, and that 3 would fail. Results also validate a correlation between the GRE, gender, race, and undergraduate GPA in predicting ExCet scores. (Contains 23 references.) (SLD)

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A Five – Year Analysis of GRE, Race, Gender, and Undergraduate GPA As Predictors of State Certification Examination Results

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There is an increasing shortage of certified school administrators across the nation to replace those who are retiring or leaving the field (Potter, 2001; Fenwick & Pierce, 2001; Erlandson, 2000; Steinberg, 2000; Richardson, 1999; Million, 1998; "Study Warns," 1998). According to the U.S. Bureau of Labor Statistics, it is becoming more difficult to attract administrative candidates at both the elementary and secondary levels. This shortage is likely to grow as shown by a forecast growth rate of 10% - 20% and is particularly acute for women and minorities (U.S. Bureau of Labor Statistics, 2000-01). Concurrently, many states are implementing difficult certification/licensure examinations (Texas Administrative Code. Accountability System for Educator Preparation 19§241.01a, 1999). This is particularly true in Texas where the Examination for the Certification of Educators in Texas (ExCet) is required for anyone seeking initial or additional certification (TEC, sub.D: chap. 21.048a, TAC, subchap. M., ASEP 19§230.413, 1999). It is paradoxical that while there is an increasing call for more administrators, the tests are scaled to become increasingly difficult to pass. Universities are under strong accountability pressure to produce graduates that pass the examination in totality as well as by racial and gender subgroups (TAC, ASEP 19§229.3 a,1,A, 1999; TAC, ASEP 19§229.3 e,2,B, 1999). If students in totality and in each subgroup do not score an increasing benchmark passing rate or above, the university will be placed under review (TAC, ASEP 19§229.3 e,3, 1999). The university will lose the ability to offer any certifications if scores do not reach or exceed the benchmark (TAC, ASEP 19§229.3 f,3, 1999). The effects of these accountability policies produces strong discourse and fiercely divergent opinion on equity issues such as instructional delivery systems, what constitutes a low-risk or high-risk applicant, as well as who should be admitted and under what conditions.

It is critically important to develop policies to address admissions, instructional, and curricular decisions and student support services that contribute to equitable and knowledgeable future school leaders. This study addresses the factors of GRE, race, gender, and undergraduate GPA as predictors of certification examination success. In a paper presentation format, open discussion will focus on the effects of high stakes accountability policies on the development of appropriate curriculum and instruction and the nurturance of an equitable and multicultural society. Are the two mutually exclusive?

Objectives or Purposes

- Can the Graduate Record Examination (GRE), race, gender, and/or undergraduate Grade Point Average (GPA) be used to predict administrative certification examination scores?
- Can statistically valid prediction equations be developed utilizing any or all of these factors?
- What would the regression/prediction equations be?
- What broader instructional, admissions, and advising implications can this have?

Perspective(s) or Theoretical Framework

Although there is considerable discussion about the validity of the GRE as a predictor of educational administration graduate school success (Lindle & Rinehart, 1998; Wendel, 1991; Nagi, 1975) there have been no known studies of its' use on state licensure/certification examination passing rates. The issues of gender, race, and undergraduate GPA further complicate the issue. House's (1998, 1997) studies of GRE and gender found that while the GRE generally was predictive of graduate performance, in a number of cases it under predicted the achievement of female students and over predicted the achievement of males. Wilson (1986) studied the relationship of GRE general test item scores and compared them with

undergraduate grades for various subgroups. He found verbal and analytical ability items rather than qualitative items provided more information than total scores, yet he did not draw conclusions towards overall graduate school performance nor certification/licensure issues. The work of Lindle & Rinehart (1998) found GRE analytic scores should be given more weight in educational administration admissions decisions. Over 20 years ago Nagi (1975) began looking at the validity of the GRE and the Miller Analogies Test (MAT) as predictors of completion of the doctoral program in educational administration at the State University of New York at Albany. Comparisons between the MAT and GRE with educational administration graduate school performance have continued as Wendel (1991) correlated these with measurements obtained through authentic assessment by the Assessment Center Project of the National Association of Secondary School Principals. White & Burke (1994) examined the correlation between student teachers' scores on the professional development ExCet with GPA and SAT scores. They found that SAT and GPA were significantly predictive of teacher ExCet scores. Nance & Kinnison (1988) concluded that the high correlation between education GPA and ExCet test and subtest scores were all statistically significant at high levels, but future investigations should attempt to determine whether the subject matter tests are measuring the content taught. As yet, no one has connected GRE, race, gender, and undergraduate GPA into one study as predictors of passing state administrative certification/licensure examinations. This study is necessary to provide equitable admissions, instructional designs, and support services and to determine if a statistically significant correlation exists between any of the factors.

Methods, Techniques, or Modes of Inquiry

From 1996-2001 over 337 students completed administrative certification requirements at this large urban university. The following methods and techniques were implemented and analyzed:

- A computer generated multiple regression analysis using SAS® software determined there was a significant relationship between the GRE, race, gender, and undergraduate GPA in predicting ExCet scores.
- Ethnic subgroups (Black, Hispanic, Asian, Indian) were combined to become more robust. The subsequent minority N was 60.
- A logistic regression was utilized to develop a predictive model for the probability of passing the ExCet examination. The model was run using sex, ethnicity, and GRE. Since GPA was not found to be significant in the equation, it was eliminated from the model.

Data Sources or Evidence

Evidence of GRE scores, race, gender, and undergraduate GPA were obtained from Graduate College records. ExCet scores were supplied by the Texas State Board for Educator Certification. These scores were disaggregated based on the identified factors.

Results and/or Conclusions – Points of View

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	4619.22743	1154.80686	27.71	< .0001
Error	236	9836.90535	41.68180		
Total	240	14456			

Root MSE	6.45614	**R-Square**	0.3195
Dep Mean	81.36929	**Adj R-Sq**	0.3080
Coeff Var	7.93437		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t-value	PR > ITI
Intercept	1	50.19662	3.59916	13.95	< .0001
Sex	1	2.32302	0.91654	2.53	0.0119
Ethnic	1	2.53441	0.94267	2.69	0.0077
GPA	1	2.15331	0.96772	2.23	0.0270
GRE	1	0.02197	0.00275	7.99	<.0001

A regression model was fit with ExCet scores as the dependent variable. The independent variables were sex, ethnic, GPA and GRE scores. Indicator variables are:

Sex: Female = 1, Male = 0

Ethnicity: White = 1, Non-white = 0

The regression equation to predict future ExCet examination scores therefore is:

ExCet = 50.2 + 2.3SEX + 2.5ETHNICITY+ 2.2GPA + .02GRE

Results indicate the following conclusions:

- If everything else is held constant:
  - There is a linear relationship between ExCet scores and sex, ethnicity, GPA and GRE.
  - A female candidate will score 2.3 units higher on the ExCet than a male candidate.
  - A male candidate will score 2.3 units lower on the ExCet than a female candidate.
  - A white student will score 2.5 units higher on the ExCet compared to a student who is not white.
  - A student who is not white will score 2.5 units lower on the ExCet compared to a white student.
  - ExCet scores will increase by .02 units for each additional GRE point.
    - For example, if you increase the GRE by 1 unit the ExCet score will increase by .02, for students of the same race, gender, and GPA.

- The scatter of the residuals was random around zero, indicating that the model/equation is a good fit.
- The adjusted coefficient of determination (R^2) of 31% shows that 31% of the variations in the ExCet score are explained by the model. Social Science data generally does not have very high R^2.
- All the prediction equation variables were significant at the 0.05 level. Therefore, there is strong evidence to conclude that the equation could be used for formative admission and instructional decisions, the guidance and counseling of current and perspective students, and the development of appropriate support services for students predicted to be at-risk.

Results of the logistic regression to develop a model as a predictor of ExCet success were run using sex, ethnicity and GRE. The GPA variable was found not to be significant in the equation and eliminated. Calculations are shown below.

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
Intercept	1	-7.8549	2.1312	13.5840	0.0002
Sex	1	1.0817	0.5518	3.8430	0.0500
Ethnic	1	1.3425	0.5160	6.7683	0.0093
GRE	1	0.00997	0.00236	17.8133	<.0001

Classification Table

	Correct		Incorrect		Percentages				False	False
Prob Level	**Event**	**Non-Event**	**Event**	**Non-Event**	**Correct**	**Sensi-tivity**	**Speci-ficity**	**POS**	**NEG**	
.500	216	4	19	3	90.9	98.6	17.4	8.1	42.9	

The probability equation:

$$\text{Log}\left(p/(1-p)\right) = -7.9 + 1.08SEX + 1.34ETHNIC + .01GRE$$

$$p(\text{Pass}) = \frac{e(-7.9 + 1.08SEX + 1.34ETHNIC + 0.01GRE)}{1 + e(-7.9 + 1.08SEX + 1.34ETHNIC + 0.01GRE)}$$

Mean GRE = 959

Indicator variables:

Sex: Female = 1, Male = 0

Ethnicity: White = 1, Non-white= 0

Results:

H_0: The prediction model is not statistically useful in determining if a student will pass ExCet.

H_1: The prediction model is statistically useful in determining if a student will pass ExCet.

Out of the 219 students who actually passed, the model predicted that 216 of them would pass and that 3 would fail. The remaining students had missing values on some variables and, therefore, could not be used in the analysis. The model classified 90.9% of the observations in the data set correctly.

Conclusions of the Study:

Reject H_0. There is sufficient evidence to support the model's utility. Based on the analysis of this five-year study, the model/probability equation is useful in predicting if a student will pass the certification examination.

Educational or Scientific Importance of the Study

This study has serious implications for educational administration programs as well as others that require state certification/licensure examinations. With increasing accountability and performance standards, colleges are under close scrutiny for student scores on certification examinations. Through longitudinal research a prediction/regression equation has been developed.

Implications of the importance of this study are broad.

- Other universities can replicate the process to develop their own equations based on their student population and certification/licensure examination.
- All universities must individually determine what factors have significance upon their certification/licensure passing rates and what can be done to improve them.
- Prediction equations could be utilized for probationary admissions decisions and instructional assistance for students determined to be at-risk instead of denying potential future school leaders the opportunity to learn. This is particularly important for under-represented populations.
- Future research must determine, implement, and evaluate specific advising and support services which will best benefit at-risk students.

This study validates there is a correlation between the GRE, gender, race, and undergraduate GPA in predicting ExCet scores. The development and utilization of probability equations will be of increasing importance as Colleges of Education are under increased accountability for the performance of their students as well as addressing the growing national shortage of certified school administrators to benefit a changing and more diversified society.

The planning, implementation, and evaluation of specific strategies to address the needs of students will be necessary for both student and university success in addressing the needs of a democratic society.

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